Unit 2: Graphs and Graph Theory
2.04 Paths and Circuits

Walk: to walk along a graph means to move from one vertex to the next along the edges of the graph.

Path: each walk on a graph is called path. The vertices and edges <u>can</u> be repeated on the same path (all of the possible routes).

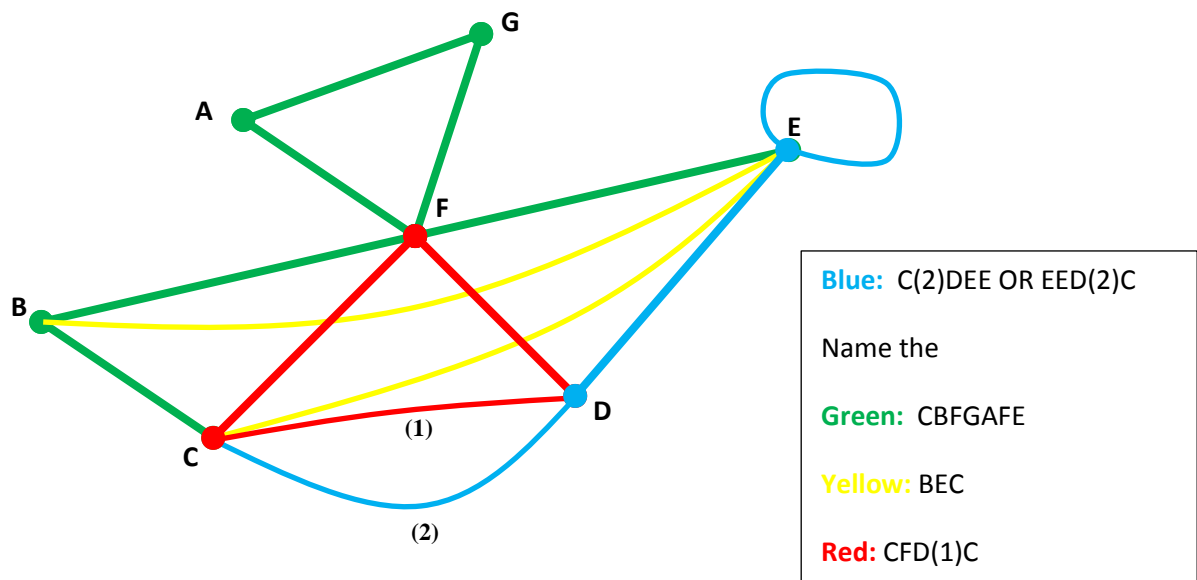**Simple Path:** a walk on which <u>**NO**</u> edges are repeated

Extremities: the extremities of a path are vertices.

Labelling a Path

A path is labelled by listing its vertices.
- If there are parallel edges, the edges are numbered to reduce confusion.

Ex:

Blue: C(2)DEE OR EED(2)C

Name the

Green: CBFGAFE

Yellow: BEC

Red: CFD(1)C

There are two measures of a path:

- **<u>Length</u>**: the number of edges contained in the path
- **<u>Distance</u>**: the length of the shortest path joining the two vertices. It is denoted by d(A, B).

Ex:
1. Give the length of each path
   a. CBFGAF = 5
   b. C(2)DEE = 3
   c. BEC = 2
   d. CFD = 2
2. Find:
   a. d(A, E) = 2
   b. d(B, E) = 1
   c. d(B, C) = 1
   d. d(E, C) = 1

Practice: Carousel   Page: 85 # 1 –22
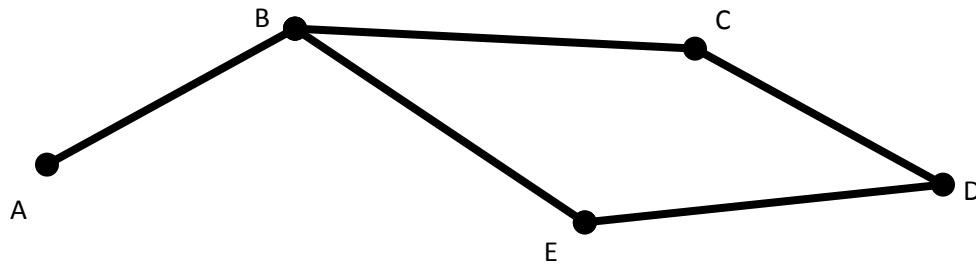   Visions   Page 27 #1, 5a, 9, 10,

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Circuit: a path that begins and ends at the same vertex is called a circuit

Simple Circuit: a path that begins and ends at the same vertex **without** passing over the same edge twice.

Ex 1:

a) Is ABCDEB a circuit?
   No, it does not start and end at A
b) Give 5 names for a simple circuit.

   BCDEB   BEDCB   CDEBC   CBEDC
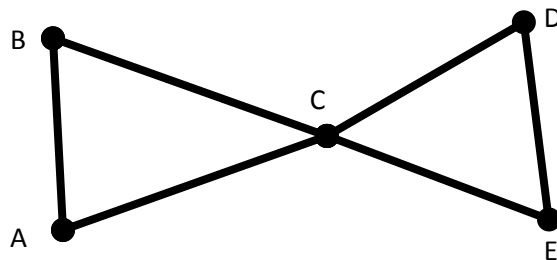
   DEBCD   DCBED   EBCDE   EDCBE

Ex 2:

1. Name four simple circuits
   so many options!!
2. How many circuits are there?
    INFINITE!!